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1 Fast power estimation for deterministic input streams
Luca Benini, Giovanni De Micheli, Enrico Macii, Massimo Poncino, Riccardo Scarsi
November 1997 **Proceedings of the 1997 IEEE/ACM international conference on Computer-aided design**

Full text available: 📄 pdf(958.88 KB)   Additional Information: full citation, abstract, references, citings, index terms
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The power dissipated by digital systems under realistic input stimuli is not accurately described by a single average value, but by a waveform that shows how power consumption varies over time as the system responds to the inputs. We face the problem of obtaining accurate power waveforms for combinational and sequential circuits under typical usage patterns. We propose a multi level simulation engine that achieves high accuracy in estimating the average power as well as the time domain power wav ...

Keywords: accurate power waveforms, average power, combinational circuits, computational efficiency, deterministic input streams, digital systems, fast power estimation, multi level simulation engine, power consumption, power dissipation, realistic input stimuli, sequential circuits, time domain power waveform, typical usage patterns

2 Stream query processing II: Chain: operator scheduling for memory minimization in data stream systems
Brian Babcock, Shivnath Babu, Rajeev Motwani, Mayur Datar
June 2003 **Proceedings of the 2003 ACM SIGMOD international conference on Management of data**

Full text available: 📄 pdf(299.62 KB)   Additional Information: full citation, abstract, references, citings, index terms

In many applications involving continuous data streams, data arrival is bursty and data rate fluctuates over time. Systems that seek to give rapid or real-time query responses in such an environment must be prepared to deal gracefully with bursts in data arrival without compromising system performance. We discuss one strategy for processing bursty streams - -- *adaptive, load-aware scheduling* of query operators to minimize resource consumption during times of peak load. We show that the cho ...

3 Aurora: a new model and architecture for data stream management
Daniel J. Abadi, Don Carney, Ugur Çetintemel, Mitch Cherniack, Christian Convey, Sangdon Lee, Michael Stonebraker, Nesime Tatbul, Stan Zdonik

August 2003 **The VLDB Journal — The International Journal on Very Large Data Bases,**
Volume 12 Issue 2
Full text available: pdf(585.97 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>index terms</u>

Abstract.This paper describes the basic processing model and architecture of Aurora, a new system to manage data streams for monitoring applications. Monitoring applications differ substantially from conventional business data processing. The fact that a software system must process and react to continual inputs from many sources (e.g., sensors) rather than from human operators requires one to rethink the fundamental architecture of a DBMS for this application area. In this paper, we present Aur ...

Keywords: Continuous queries, Data stream management, Database triggers, Quality-of-service, Real-time systems

4   <u>Research sessions: continuous queries and streams: Rate-based query optimization</u>   ■
    <u>for streaming information sources</u>
    Stratis D. Viglas, Jeffrey F. Naughton
    June 2002 **Proceedings of the 2002 ACM SIGMOD international conference on**
              Management of data
    Full text available: pdf(1.11 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

    Relational query optimizers have traditionally relied upon table cardinalities when estimating the cost of the query plans they consider. While this approach has been and continues to be successful, the advent of the Internet and the need to execute queries over streaming sources requires a different approach, since for streaming inputs the cardinality may not be known or may not even be knowable (as is the case for an unbounded stream.) In view of this, we propose shifting from a cardinality-ba ...

5   <u>Testing and spot-checking of data streams (extended abstract)</u>   ■
    J. Feigenbaum, S. Kannan, M. Strauss, M. Viswanathan
    February 2000 **Proceedings of the eleventh annual ACM-SIAM symposium on Discrete**
                  algorithms
    Full text available: pdf(928.69 KB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

6   <u>Characterizing memory requirements for queries over continuous data streams</u>   ■
    Arvind Arasu, Brian Babcock, Shivnath Babu, Jon McAlister, Jennifer Widom
    March 2004 **ACM Transactions on Database Systems (TODS)**, Volume 29 Issue 1
    Full text available: pdf(328.06 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

    This article deals with continuous conjunctive queries with arithmetic comparisons and optional aggregation over multiple data streams. An algorithm is presented for determining whether or not any given query can be evaluated using a bounded amount of memory for all possible instances of the data streams. For queries that can be evaluated using bounded memory, an execution strategy based on constant-sized synopses of the data streams is proposed. For queries that cannot be evaluated using bounde ...

    Keywords: Continuous queries, memory requirement, streams

7   <u>Database session 5: management of data streams: Queueing analysis of relational</u>   ■
    <u>operators for continuous data streams</u>
    Qingchun Jiang, Sharma Chakravarthy
    November 2003 **Proceedings of the twelfth international conference on Information and**

knowledge management

Full text available: pdf(265.89 KB)　　Additional Information: full citation, abstract, references, index terms

Currently, stream data processing is an active area of research, which includes everything from algorithms and architectures for stream processing to modelling, and analysis of various components of a stream processing system. In this paper, we present an analysis of relational operators used for stream processing using queueing theory and study behaviors of streaming data in a query processing system. Our approach enables us to compute the fundamental performance metrics of relational operators ...

Keywords: data stream, queueing analysis, relational operators

8　Stream query processing I: Approximate join processing over data streams

Abhinandan Das, Johannes Gehrke, Mirek Riedewald

June 2003 **Proceedings of the 2003 ACM SIGMOD international conference on Management of data**

Full text available: pdf(282.87 KB)　　Additional Information: full citation, abstract, references, citings, index terms

We consider the problem of approximating sliding window joins over data streams in a data stream processing system with limited resources. In our model, we deal with resource constraints by shedding load in the form of dropping tuples from the data streams. We first discuss alternate architectural models for data stream join processing, and we survey suitable measures for the quality of an approximation of a set-valued query result. We then consider the number of generated result tuples as the q ...

9　Implementation techniques: The Multics input/output system

R. J. Feiertag, E. I. Organick

June 1972 **ACM SIGOPS Operating Systems Review**, Volume 6 Issue 1/2

Full text available: pdf(838.54 KB)　　Additional Information: full citation, abstract

An I/O system has been implemented in the Multics system that facilitates dynamic switching of I/O devices. This switching is accomplished by providing a general interface for all I/O devices that allows all equivalent operations on different devices to be expressed in the same way. Also particular devices are referenced by symbolic names and the binding of names to devices can be dynamically modified. Available I/O operations range from a set of basic I/O calls that require almost no knowledge ...

10 The Multics Input/Output system

R. J. Feiertag, E. I. Organick

October 1971 **Proceedings of the third ACM symposium on Operating systems principles**

Full text available: pdf(701.78 KB)　　Additional Information: full citation, abstract, references, citings, index terms

An I/0 system has been implemented in the Multics system that facilitates dynamic switching of I/O devices. This switching is accomplished by providing a general interface for all I/O devices that allows all equivalent operations on different devices to be expressed in the same way. Also particular devices are referenced by symbolic names and the binding of names to devices can be dynamically modified. Available I/0 operations range from a set of basic I/0 calls that require almost no knowl ...

11 Polygon rendering on a stream architecture

John D. Owens, William J. Dally, Ujval J. Kapasi, Scott Rixner, Peter Mattson, Ben Mowery

August 2000 **Proceedings of the ACM SIGGRAPH/EUROGRAPHICS workshop on Graphics hardware**

Full text available: 🔒 pdf(161.65 KB)   Additional Information: full citation, abstract, references, citings, index terms

The use of a programmable stream architecture in polygon rendering provides a powerful mechanism to address the high performance needs of today's complex scenes as well as the need for flexibility and programmability in the polygon rendering pipeline. We describe how a polygon rendering pipeline maps into data streams and kernels that operate on streams, and how this mapping is used to implement the polgyon rendering pipeline on Imagine, a programmable stream processor. We compare our resul ...

Keywords: OpenGL, SIMD, graphics hardware, kernels, media processors, polygon rendering, stream architecture, stream processing, streams

12 Stream synthesis for efficient power simulation based on spectral transforms

Alberto Macii, Enrico Macii, Massimo Poncino, Riccardo Scarsi

August 1998 **Proceedings of the 1998 international symposium on Low power electronics and design**

Full text available: 🔒 pdf(750.84 KB)   Additional Information: full citation, abstract, references, index terms

In this paper, we present a power estimation technique for control-flow intensive designs that is tailored towards driving iterative high-level synthesis systems, where hundreds of architectural trade-offs are explored and compared. Our method is fast and relatively accurate. The algorithm utilizes the behavioral information to extract branch probabilities, and uses these in conjunction with switching activity and circuit capacitance information, to estimate the power consumption of a given ...

13 Research sessions: stream QP: Dynamic plan migration for continuous queries over data streams

Yali Zhu, Elke A. Rundensteiner, George T. Heineman

June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data**

Full text available: 🔒 pdf(282.13 KB)   Additional Information: full citation, abstract, references

Dynamic plan migration is concerned with the on-the-fly transition from one continuous query plan to a semantically equivalent yet more efficient plan. Migration is important for stream monitoring systems where long-running queries may have to withstand fluctuations in stream workloads and data characteristics. Existing migration methods generally adopt a pause-drain-resume strategy that pauses the processing of new data, purges all old data in the existing plan, until finally the new plan can b ...

14 Research sessions: stream QP: Static optimization of conjunctive queries with sliding windows over infinite streams

Ahmed M. Ayad, Jeffrey F. Naughton

June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data**

Full text available: 🔒 pdf(228.97 KB)   Additional Information: full citation, abstract, references

We define a framework for static optimization of sliding window conjunctive queries over infinite streams. When computational resources are sufficient, we propose that the goal of optimization should be to find an execution plan that minimizes resource usage within the available resource constraints. When resources are insufficient, on the other hand, we propose that the goal should be to find an execution plan that sheds some of the input load (by randomly dropping tuples) to keep resource usag ...

15 Linear analysis and optimization of stream programs

Andrew A. Lamb, William Thies, Saman Amarasinghe

May 2003 **ACM SIGPLAN Notices , Proceedings of the ACM SIGPLAN 2003 conference on Programming language design and implementation**, Volume 38 Issue 5

Full text available: pdf(489.80 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

As more complex DSP algorithms are realized in practice, there is an increasing need for high-level stream abstractions that can be compiled without sacrificing efficiency. Toward this end, we present a set of aggressive optimizations that target linear sections of a stream program. Our input language is StreamIt, which represents programs as a hierarchical graph of autonomous filters. A filter is linear if each of its outputs can be represented as an affine combination of its inputs. Linearity ...

Keywords: DSP, FFT, StreamIt, algebraic simplification, embedded, linear systems, optimization, stream programming

16 Optimal smoothing schedules for real-time streams (extended abstract)
Yishay Mansour, Boaz Patt-Shamir, Ofer Lapid
July 2000 **Proceedings of the nineteenth annual ACM symposium on Principles of distributed computing**

Full text available: pdf(857.38 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

We consider the problem of smoothing real-time streams (such as video streams), where the goal is to reproduce a variable-bandwidth stream remotely, while minimizing bandwidth cost, space overhead, and playback delay. We focus on lossy schedules, where some bytes may be dropped due to limited bandwidth or space. We present the following results. First, we determine the optimal tradeoff between buffer space, queuing delay, and link bandwidth for lossy smooth ...

17 Research sessions: stream QP: Adaptive ordering of pipelined stream filters
Shivnath Babu, Rajeev Motwani, Kamesh Munagala, Itaru Nishizawa, Jennifer Widom
June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data**

Full text available: pdf(534.72 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>

We consider the problem of *pipelined filters*, where a continuous stream of tuples is processed by a set of commutative filters. Pipelined filters are common in stream applications and capture a large class of multiway stream joins. We focus on the problem of ordering the filters adaptively to minimize processing cost in an environment where stream and filter characteristics vary unpredictably over time. Our core algorithm, *A-Greedy* (for *Adaptive Greedy*), has strong theoretic ...

18 Database issues for event-based middleware: MJoin: a metadata-aware stream join operator
Luping Ding, Elke A. Rundensteiner, George T. Heineman
June 2003 **Proceedings of the 2nd international workshop on Distributed event-based systems**

Full text available: pdf(229.21 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>

Join algorithms must be re-designed when processing stream data instead of persistently stored data. Data streams are potentially infinite and the query result is expected to be generated incrementally instead of once only. Data arrival patterns are often unpredictable and the statistics of the data and other relevant metadata often are only known at runtime. In some cases they are supplied interleaved with the actual data in the form of stream markers. Recently, stream join algorithms, like Sym ...

Keywords: Metadata, XML Stream, XQuery Subscription, constraint, join algorithms,

optimization

19 Reductions in streaming algorithms, with an application to counting triangles in graphs
Ziv Bar-Yosseff, Ravi Kumar, D. Sivakumar
January 2002 **Proceedings of the thirteenth annual ACM-SIAM symposium on Discrete algorithms**

Full text available: pdf(1.09 MB)   Additional Information: full citation, abstract, references, citings

We introduce *reductions* in the streaming model as a tool in the design of streaming algorithms. We develop the concept of *list-efficient* streaming algorithms that are essential to the design of efficient streaming algorithms through reductions.Our results include a suite of list-efficient streaming algorithms for basic statistical primitives. Using the reduction paradigm along with these tools, we design streaming algorithms for approximately counting the number of triangles in a g ...

20 Research session 7: queries and views: Characterizing memory requirements for queries over continuous data streams
Arvind Arasu, Brian Babcock, Shivnath Babu, Jon McAlister, Jennifer Widom
June 2002 **Proceedings of the twenty-first ACM SIGMOD-SIGACT-SIGART symposium on Principles of database systems**

Full text available: pdf(229.06 KB)   Additional Information: full citation, abstract, references, citings, index terms

We consider conjunctive queries with arithmetic comparisons over multiple continuous data streams. We specify an algorithm for determining whether or not a query can be evaluated using a bounded amount of memory for all possible instances of the data streams. When a query can be evaluated using bounded memory, we produce an execution strategy based on constant-sized synopses of the data streams.

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